



4.5
5.0

2.8

2.5

3.6
4.0

3.2

2.2

4.5
5.0
5.6
6.3
7.1
8.0
9.0
10.0

3.6

2.0

4.0

2.0



1.8



1.6

RESPONSE OF KNEE EXTENSOR AND FLEXOR MUSCLES TO A REPEATED MAXIMAL ISOMETRIC TASK. William Monsen and Donald Campbell, Oregon State University.

The purpose of this study was to investigate the response of the flexor and extensor muscle groups of the knee to a repeated maximal isometric task. Design and analysis was related to three hypotheses: 1) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task, 2) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task when considered by three strength levels, 3) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task when considered by trial intervals. Forty-five young adult male student volunteers served as test subjects. Homogeneous strength level groups were developed on the basis of data collected from specific isometric knee extension and knee flexion tests. Experimental test procedures and equipment were similar to those described by Clarke. Following an introductory period, subjects were given a 30 trial isometric knee extension and a 30 trial isometric knee flexion test. Three second maximal contractions for each of the 30 trials were followed by 10 second intertrial rest intervals with a minimum of 20 minutes between tests. Provisions for complete relaxation of the involved muscle group for each of the two tests were made. Analysis of data was done on the basis of a $2 \times 3 \times 4$ triple classification factorial analysis of variance test design. Reciprocal strength decrement index (SDI) scores served as the criterion measure to test the three hypotheses of the study. Analysis of the simple effects of the raw scores (tension pounds) provided additional insight into significant differences in the response of the knee joint musculature. The .05 level of significance was chosen for rejection of the null hypotheses. Based on the test design and analysis of the null hypotheses the following conclusions seemed justified: 1) no significant difference existed in the response of the extensor and flexor muscles of the knee when performing a 30 trial maximal isometric task with 10 seconds intertrial rest intervals, 2) when considered by strength levels, no significant difference existed in the response of the extensor and flexor muscles of the knee when performing a 30 trial isometric task with 10 second intertrial rest intervals, 3) a significant difference existed between the response of the extensor and flexor muscle of the knee when considered by trial intervals.

Donald E. Campbell
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April 15, 1973
4:15 p.m.

TELEMETERED HEART RATE RESPONSE OF YOUNG ICE HOCKEY PLAYERS.
Georges E. Larivière, Université du Québec à Trois-Rivières.

The heart rate responses of ten young ice hockey players were measured, by means of radio telemetry, during one entire game of an important post-season tournament. The results of the measurement showed that the mean skating heart rate was 161.0, 158.8 and 151.3 beats/min. for period number one, two and three respectively. The mean resting heart was 132.7 for period one, 129.7 for period two and 127.3 beats/min. for period three. The forward players had an average heart rate higher than the defense players, during the playing as well as during the resting period. Due to emotional stress, the heart did not drop as fast as expected during the testing periods given to the players between their presence on the ice. A player who remained seated on the bench for the entire first period had an average heart rate of 125.1 beats/min., while the highest heart rate measured during playing time was 265 beats/min.

Georges E. Larivière
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Université du Québec
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April 15, 1973
4:30 p.m.

TWO-FACTOR THEORY OF PRELIMINARY EXERCISE. Hugh W. Bonner,
The University of Texas at Austin.

Sixty male subjects performed 10 minutes of preliminary exercise of pedaling a bicycle ergometer against a work load of either 350, 500, 650, 800, or 900 kpm/min. The criterion task consisted of working against an initial work load of 1632 kpm/min. Necessarily, the rate declined progressively with increasing fatigue. The criterion task was also performed without preliminary exercise with each subject serving as his own control. A balanced order design was utilized. The difference scores, calculated by subtracting the experimental from the control condition were cumulated progressively by minute to permit analysis of the time pattern. The two-factor theory postulates concurrent facilitory and fatigue factors resulting from preliminary exercise; the net effect rising to an optimum then declining to eventually become negative as the preliminary task is progressively increased. It predicts a similar pattern as a function of the time duration of the criterion task. Generally, the results support the two-factor theory. Considered as a function of the amount of preliminary exercise, the net positive effect is evident at 350 kpm/min; is maximal at 650; declines to approximately zero at 800; and is strongly negative at 950. Appropriate variance analysis establish these findings to be statistically significant. While the mean scores of the groups follow this pattern, individual differences exist as evidenced by correlation between individual gain/loss scores across treatment conditions that range from $r=.62$ to $.89$. Even for the most favorable condition (650 kpm/min), where the mean effect is strongly positive; 26% of the subjects exhibit performance decrements.

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April 15, 1973
4:45 p.m.

ADMINISTRATIVE BEHAVIOR OF SUCCESSFUL AND UNSUCCESSFUL
ATHLETIC DIRECTORS IN SMALL COLLEGES AND UNIVERSITIES

This study examined the administrative behavior of "successful" and "unsuccessful" small college athletic directors. It was hypothesized that significant differences would be found in the administrative behavior of athletic directors in schools with successful and unsuccessful athletic teams. A questionnaire containing three test measures was completed by 148 small college directors, of whom 45 were identified as successful and 50 as unsuccessful. These two groups constituted the actual sample. The test measures used were: (1) a Responsibility, Authority, and Delegation (RAD) Scale, which measured differences in perceived responsibility, authority, and delegation; (2) a Work Analysis Form (WAF), designed to measure various aspects of administrative performance; and (3) a Leadership Opinion Questionnaire (LOQ), which was designed to measure a leader's orientation around two factors: structure and consideration. The findings of this study did not support the hypothesis tested. Statistically significant differences were found between successful and unsuccessful administrators' response to only 8 of the 121 items measured; furthermore, in all 8 items, the clustering points for the responses of both groups of directors were essentially the same. If the win-loss record of a college's athletic teams is to be accepted as the criterion for identifying successful or unsuccessful athletic directors, then it should follow that successful and unsuccessful directors must differ in some way. Whether the difference can be pinpointed as lying in one specific area, such as administrative behavior, appears to be highly doubtful. On the basis of the findings of this study, it must be concluded that the success or lack of success of small college athletic teams does not necessarily reflect differences in administrative behavior of the athletic directors involved.

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April 15, 1973
2:00 p.m.

THE HIGH SCHOOL ATHLETIC DIRECTOR: A COMPARATIVE STUDY OF
BEHAVIOR. Lloyd Mike Morris, Northwest Missouri State
University.

The purpose of this study was to compare descriptions of the athletic director's leader behavior, as self-perceived, with descriptions of that same behavior as perceived by the athletic coaching staff relative to their responsibility and amount of social distance. Subjects for the study were athletic directors and coaches from 20 randomly selected Class-AA high schools throughout the state of Illinois. The athletic directors were requested to describe their own leader behavior, as self-perceived, by responding to items on the Leader Behavior Description Questionnaire. Coaches responded on an alternate form of the same instrument. The amount of social distance that existed between the athletic director and coaching staff was assessed through the use of the Social Distance Scale. Results of t tests on mean described scores were significant at the .01 level of confidence, indicating a discrepancy between self-perceptions of the athletic director's leader behavior, and perceptions held by the coaching staff. Results of analysis of variance tests for social distance categories yielded significant differences at the .01 level, for all applications. The greater the amount of social distance between the athletic director and coaching staff, the greater the amount of discrepancy in perceptions of leader behavior. Based on the findings of this study, the following conclusions were drawn: A significant discrepancy may exist between the athletic director and the coaching staff relative to perceptions of the same behavior. Consistent higher scoring on items relative to staff consideration indicated tenable implications regarding the importance of human relations between the athletic director and the coaching staff. The proportionate increase in described scores of leader behavior, relative to the decrease in social distance, indicated the desirability of increasing both the frequency and nature of contact between the athletic director and the coaching staff to achieve greater congruency in perceptions of leader behavior..

Lloyd Mike Morris
Dept. of Physical Education
Northwest Missouri State University
Maryville, Missouri

April 15, 1973
2:15 p.m.

A STUDY OF THE ATTITUDES AFFECTING THE BEHAVIOR OF THE
ADMINISTRATION OF INTERCOLLEGIATE ATHLETICS. David M. Hutter,
S.U.C. Brockport; Professor Willard P. Ashbrook, Advisor.

The primary purpose of this study was to determine relationships, if any, between expressed attitudes of those associated with the administration of intercollegiate athletics and the practices in effect in their respective institutions. In an attempt to analyze hypotheses, an attitude scale was developed utilizing the scale-discrimination technique. Its purpose was to measure the attitudes of administrators toward the administration of intercollegiate sport. Responses to the items were of the Likert variety. The attitude scale had a reliability coefficient of 0.95. The uni-dimensionality or coefficient of reproducibility of the scale was estimated to be 0.82. A catalog of administrative practices was developed to collect data regarding the administrative policies and practices that were in effect in the sample of colleges. The subjects of this study were twenty-two presidents, twenty-three faculty representatives, twenty-seven athletic directors, and twenty-three coaches from thirty-one Ohio colleges. This represented seventy-eight per cent of the 121 individuals to whom the questionnaires were distributed. The correlation (0.49) between the practice inventory and mean attitude score of an institution led to a rejection of the hypothesis that "there will be no significant relationship between the expressed attitudes of personnel responsible for the administration of intercollegiate athletics and policies and practices in effect." This implied that there may be a degree of relationship between attitudes and practices, when attitudes are viewed collectively. However, when the correlations between attitude scores of each group and the practice inventory were computed no significant relationships, at the .05 level, were noted. The hypothesis "that there will be no significant differences between the attitudes of presidents, faculty representatives, athletic directors, and coaches concerning the conduct of intercollegiate sport" was rejected. There were significant differences, at the .05 level, between the attitudes of presidents, faculty representatives, athletic directors, and coaches concerning the administration of intercollegiate athletics.

David M. Hutter
Sports Science
S.U.C. Brockport, N.Y. 14420

April 15, 1973
2:30 p.m.

A STUDY OF FACULTY STAFF RECREATION ASSOCIATIONS IN COLLEGES AND
UNIVERSITIES IN THE UNITED STATES. Ronald W. Hyatt, University
of North Carolina-Chapel Hill.

The purpose of this study was to determine the status of Faculty Staff Recreation Associations or like organizations which existed to promote recreational opportunities for faculty and staff. This study was not concerned with faculty recreation programs in the intramural program context but dealt with formal organizations possessing charters and facilities separate for the faculty and staff. A questionnaire was sent to 52 colleges and universities in the U.S. The questionnaire sought to locate the types of organization and facilities which existed for the faculties' recreational welfare. Other objectives were to locate administrative dysfunctions to be avoided in the management of these clubs and to provide prototype models of charters and facility installation for other colleges to use in establishing faculty staff recreation associations. Seven associations exist on different college campuses across the U.S. The number of members range from 70 to 1250. Membership eligibility in five schools provided for the faculty and staff to belong. Cost of membership ranged from 0 to \$225 with dues ranging from 0 to \$30 per month. Long term debt ranged from 0 to \$1,200,000. Four associations had paid directors with two having written job descriptions for managers. Operating budgets ranged from \$3,500 a year to \$62,000 a year. The Program of Activities ranged from simple swimming to a comprehensive program involving food services and faculty dances. Problem areas were budget, personnel, and membership. Facilities ranged from regular facilities used jointly by faculty to comprehensive facilities including clubhouse, swimming pool, tennis courts, handball courts, nine-hole par 3 golf course, and playground picnic area. A variety of types of faculty staff recreation associations exist as models for colleges who wish to initiate a club. There are administrative problems connected with them, but their values and contributions to faculty welfare are enormous.

Dr. Ronald W. Hyatt
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Chapel Hill, North Carolina 27514

April 15, 1973
2:45 p.m.

ROLE PERCEPTIONS AND EXPECTATIONS OF COLLEGE PHYSICAL EDUCATION
CHAIRMEN'S RESPONSIBILITY PRIORITIES BY FACULTY AND CHAIRMEN.
Michael G. Davis, University of Wisconsin-River Falls.

The purpose of this study was to determine the relationships of role perceptions and expectations of the physical education chairman's actual and ideal responsibility priorities given by the members of the department and the chairman. A theoretical model was established to determine relationships of the following eight dimensions: 1) role communication, 2) expectation communication, 3) role perception communication, 4) sensitivity for the actual responsibilities, 5) sensitivity for the ideal responsibilities, 6) faculty satisfaction, 7) chairman satisfaction, and 8) philosophical agreement. Nine colleges or universities that offered a physical education major were randomly selected from Iowa, Wisconsin, and/or Minnesota. Schools were sorted into enrollments of under 4,000, 4,000 to 12,000, and over 12,000. The faculty members and chairman were given a test consisting of sixteen items concerning the faculties' and chairmen's perceptions and expectations of the actual and ideal responsibility priorities of the chairmen. A Q sort technique was found to be the most appropriate statistical procedure for the design of this study. After the Q sort, the weighted means and ranks were computed. Spearman's rank order correlational method was used to determine the amount of consolidation that existed within the eight dimensions. The closer the correlations were to 1.000 the greater the consolidations for the dimensions. There were no general patterns of consolidations found within any of the eight dimensions for the various departments. No one responsibility was ranked either as a high or low priority from either the chairmen or faculty members. In general, the levels of consolidations improved once the items were placed into the categories of administration, curriculum, public and staff relations. The three levels of communication dimensions were generally poor for all of the departments. Second, eight of the faculties and seven of the chairmen were unable to obtain correlations above .506 in the satisfaction dimensions. However, most of the chairmen had high levels of consolidation for the dimensions of sensitivity. Only four of the correlations obtained in the philosophical dimension had correlations above .506.

Michael G. Davis
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April 15, 1973
3:00 p.m.

THE DEVELOPMENT OF AN INSTRUMENT AND PROCEDURES TO ACCOMPANY THE
BOOKWALTER-DOLLGENER SCORE CARD FOR EVALUATING UNDERGRADUATE
PROFESSIONAL PROGRAMS IN PHYSICAL EDUCATION. Dr. William F.
Stier, Jr., Department of Health, Physical Education, Recreation
and Athletics, Shepherd College, Shepherdstown, West Virginia.

Although the Bookwalter-Dollgener Score Card For Evaluating Undergraduate Professional Programs in Physical Education has been criticized for the supposed lack of specificity within the instrument in respect to: (a) interpretation of the meaning of the items, (b) the method of awarding points, (c) procedures to follow in administering the instrument. This investigator made a critical analysis of each area, sub-area, and item of the score card in respect to factors which may have a bearing upon the reliability of the instrument. He developed, on the basis of the critical analysis, an instrument and procedures to accompany the score card, and field tested the reconstructed instrument and procedures. Both the Bookwalter-Dollgener score card and the reconstructed score card were field tested in four South Dakota colleges to determine if the scores obtained by the two instruments were comparable. The null hypothesis was thus stated: There is no difference between the scores obtained by the two instruments. Using the total scores as revealed by the two score cards for the selected institutions, a t-test for related samples was conducted. The t-value for the total raw scores was determined not to be statistically significant (.05 level). On the basis of t-tests which were applied to the total scores for each of the ten areas comprising both score cards, the null hypothesis was retained for all areas except Area IV, Staff Standards.

Dr. W. F. Stier, Jr.
Department of H.P.E.R.A.
Shepherd College
Shepherdstown, West Virginia

April 15, 1973
3:15 p.m.

SENSORIMOTOR PERFORMANCE AFTER-EFFECTS AND ASSOCIATED EEG
SPECTRAL PATTERNS OF OPTICALLY-DISPLACED VISION. Virginia
Scheel, California State University, Fullerton.

In the first experiment of this study, using various optical prisms and exposure to such displacement, by means of a 2 X 3 X 3 factorial design the magnitude of performance after-effects for localizing specific targets with terminal feedback was assessed. A total of 72 volunteer subjects - 36 .. and 36 women- were randomly assigned to one of six possible conditions. The subjects were exposed either to 0, 2, or 20-diopter prisms over a 10 or 50 exposure period while localizing specific targets with terminal feedback. The adaptation technique of DeWar (1970) was used. It was found that the greater the distortion of optical displacement, the greater the magnitude of performance after-effect in extant periods following sensorimotor training for localizing specific targets with terminal feedback ($p < .01$). No differences were found related to the length of exposure trials in sensorimotor training performance, nor were any differences found between the interaction of optical displacements and length of exposure to such displacements. A second experiment was designed in an attempt to obtain direct correlates between neural activity and performance behavior.. This study was conducted using the same adaptation technique, but applying the findings of the above described experiment. In the second experiment, 10 men and 10 women volunteers were exposed to a 20-diopter prism for 50 trials. The gross surface electroencephalogram (EEG) was monitored from occipital, premotor and motor scalp areas on the performing subjects. Auto-and cross-spectral frequencies of these EEG patterns were analyzed by computer both before, and at three different time intervals after learning. Using EEG spectra as independent variables in a step-wise regression analysis, post-exposure I results showed that frequencies in the beta range derived from occipital-pre-motor cross-spectrum in a slow alpha and beta frequency range correlated with performance; and for post-exposure III, in the alpha frequency range, right motor-per-motor cross-spectrum and pre-motor cross-spectrum correlated with performance.

Virginia Scheel
Department of Physical Education
California State University,
Fullerton, Fullerton, Calif. 92634

April 15, 1973
3:30 p.m.

EFFECT OF DIFFERENT LEVELS OF PHYSICAL FATIGUE UPON MOTOR
LEARNING AND SUBSEQUENT MOTOR PERFORMANCE

Jerry R. Stockard
Dept. of Physical Education
Tulane University
New Orleans, Louisiana 70118

Purpose. The purpose of this study was to determine if practicing a novel gross motor task under a specific condition of physical fatigue would influence either the learning that resulted from the practice or the subsequent performance of the task. It was hypothesized that higher levels of physical fatigue experienced during practice would have a more adverse effect on motor learning than lower levels of physical fatigue. It was also hypothesized that a novel gross motor task practiced under a specific level of physical fatigue would subsequently be performed best under that same level of physical fatigue.

Procedure. Eighty-one male college students were randomly assigned to three experimental groups for the purpose of practicing a novel gross motor task under three different levels of physical fatigue. The fatigue conditions, induced through work bouts on a friction type bicycle ergometer, were called heavy, moderate and non-fatigue. During the first week of the experiment each subject was given six practice trials. The following week each subject performed the task under each of the fatigue conditions.

Results. Analysis of the data revealed that learning did not differ significantly among the experimental groups, and 2) a novel gross motor task practiced under a specific level of physical fatigue would subsequently be performed best under that same level of fatigue. Within the limitations of this study it was concluded that in vigorous sports where physical fatigue is a factor, practice may best be held under conditions of physical fatigue which simulate actual game conditions.

Jerry R. Stockard
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April 15, 1973
3:45 p.m.

THE INFLUENCE OF SLEEP DEPRIVATION UPON FINE AND GROSS MOTOR PERFORMANCE AS INDICATED BY SELECTED SKILLS OF BALANCE, REACTION TIME, AND MOVEMENT TIME. Kaaran H. Copes, Texas Woman's University.

The influence of the loss of fifty hours of sleep upon the fine and gross motor performance of junior high school boys was investigated. Thirty-eight junior high boys were randomly placed into an experimental group and a control group, each comprised of nineteen subjects. The experimental group remained in a state of wakefulness for fifty hours whereas subjects in the control group adhered to their usual routine consisting of a normal night's sleep. Two fine motor performance tasks measuring skills of balance, reaction time, and movement time; and two gross motor performance tasks measuring these same factors were administered to both groups at twelve hour intervals during the experimental periods. Significant deterioration occurred in three of the six motor performance components of junior high school boys following fifty hours of sleep deprivation. Fine reaction time and fine and gross movement time were significantly influenced by fifty hours duration. Sleep deprivation of fifty hours may significantly influence fine or gross motor performance depending upon the specific motor performance component. Less than fifty hours loss of sleep did not appear to affect significantly motor performance.

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April 15, 1973
4:00 p.m.

PSYCHOPHYSIOLOGIC RESPONSE TO VESTIBULAR STIMULATION.
Robert E. Johnson, University of Kentucky.

The specific objective of this study was a search into the psychophysiologic response of twenty subjects to specific rotary motions. The subject's center of gravity was placed over the axis of rotation of a low friction platform. The platform was placed so that its rotation occurred in the horizontal plane. The subjects were placed on the platform in three basic positions: 1. The roll position (lying on the back), 2. The pitch position (lying on the side), and 3. The yaw position (sitting upright position). The low friction platform could be rotated either clockwise or counterclockwise. This rotation of the platform produced the situation for the subject under study to be either rolling right or left, pitching forward or backward, or yawing right or left. Each individual being tested was placed on the platform first in the roll position, then the pitch position and then the yaw position blindfolded. Blindfolding eliminated any visual clues to the direction of rotation. Each individual being tested was subjected to an angular acceleration of .628 rad/sec/sec, a constant angular velocity of .628 rad/sec for five seconds, and an angular deacceleration of -.628 rad/sec/sec in the roll right, roll left, pitch forward, pitch backward, yaw right, and yaw left positions. All twenty subjects had no difficulty in detecting the direction of rotation, in the initial positive acceleration stage, for any or all of the positions. However, when the platform was brought back to zero angular velocity all twenty subjects indicated that they were rotating in the opposite direction. This phenomenon occurred in all six situations; roll right, roll left, pitch forward, pitch backward, yaw right, and yaw left. The semicircular canals are those subsystems of the vestibular system which detect angular acceleration. Upon being rotated, the cupula, a gelatinous valve supported on sensory hair cells, transduced movement of the fluids in the canals into neural signals which was interpreted correctly by all twenty subjects. However, upon being deaccelerated and eventually brought back to zero angular velocity, the cupula would start closing, producing a dampening effect, which was transduced into a neural signal that was misinterpreted by all twenty subjects. Hence, the sensation of rotating in the opposite direction when in reality the subject was not rotating at all.

Robert E. Johnson
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April 15, 1973
4:15 p.m.

STEREOPSIS AND PERFORMANCE OF MALE ATHLETES. M. Nadine Zimmerman, Elizabeth C. Lane, Howard Fletcher, Northern Illinois University, DeKalb, Illinois.

Stereopsis of football, basketball and baseball intercollegiate participants was compared. In addition, six performance variables were investigated. Ss were 147 male athletes who played during the 1971-72 academic year. The D. C. Aviators Stereopsis Test was administered to each subject and the scores ranged from zero to 85 per cent. The analysis of variance was used to determine significance of between group differences on the level of stereopsis recorded ($p < .05$); also Scheffe's Comparison of Means was used where appropriate. T-tests were used to compare stereopsis with (1) football position (offense-defense), (2) classification (upperclassman--freshman), and (3) playing time (one-half or more--less than one-half). The relationship of (1) stereopsis and shooting percentage of basketball players, (2) batting average of baseball players and (3) grade point average for all groups was ascertained by correlation techniques. This investigation indicates a significant difference in stereopsis among the three groups and between the offensive and defensive players in football. The results show a positive relationship between stereopsis and batting average as well as stereopsis and shooting percentage. It is suggested that stereopsis can provide valuable information regarding selection of players for specific duties.

This investigation was partially supported by a grant from the Northern Illinois University Council of Deans.

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April 15, 1973
4:30 p.m.

ANALYSIS OF SECOND AND THIRD-STRATUM FACTORS USING THREE
METHODS OF SOLUTION. R. John Young & A. H. Ismail, Purdue
University.

The purpose of the study was to investigate the second- and third-stratum factors extracted using three methods of factor analytic solution on the physical fitness and personality data of 56 middle-aged males who participated in a well organized four-month physical fitness program. Personality data were collected using Cattell's 16 P.F. Questionnaire. Physical fitness scores were obtained for each individual based on the criteria of Ismail et al. Factor analyses of the fitness and personality variables were performed using the orthogonal, oblimin, and oblique forms of solution yielding second-stratum factors. Factor scores were estimated for each subject on each second-stratum factor and third-stratum factor analyses were performed. Five second-stratum factors closely resembling Cattell's factors were extracted using all three methods both initially and finally. Subtle differences were found to exist between initial and final factor structures which may have been due to the influence of the physical fitness program. Two third-stratum factors were extracted on the initial and three on the final data. They were found to be comparable in nature to Eysenck's Extroversion and Neuroticism Scales. Physical fitness loaded on both third-stratum factors initially but only on one finally; namely, Introversion -versus- Extroversion, suggesting that physical fitness and extroversion are closely related. While physical fitness would appear to be related to neuroticism and emotional stability initially, such a relationship was not observed finally. This would tend to support the notion that the lack of physical fitness is associated with emotional instability and further, that participation in a well organized physical fitness program has a stabilizing effect upon the factors affecting personality.

R. John Young
Physical Education for Men
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April 15, 1973
4:45 p.m.

MEASUREMENT OF SUBCUTANEOUS TISSUE: A COMPARISON OF ULTRASOUND
TECHNIQUE WITH THE SKINFOLD CALIPER METHOD. H.H. Merrifield,
Ithaca College; Vlado Simko and James R. Stouffer, Cornell
University.

The purpose of this investigation was to determine the relationship, if any, between the skinfold caliper method and the ultrasonic technique in measuring subcutaneous tissue. Sixteen college-aged females volunteered to serve as subjects. Two sites representing the approximate midpoints of the right arm and thigh were selected. Circumference measurements and skinfold measurements on the posterior surface of the arm and the anterior surface of the thigh were determined. The Ithaco Ultrasonic Scanner with a standard Polaroid Land film adapter was used to determine the subcutaneous skin and fat thicknesses at the same sites. The transducer scanned the arm for approximately 30 degrees and the thigh for 360 degrees. The triceps skinfold averaged 24.50 mm. and the mean triceps ultrasound was 5.63 mm. The correlation between the tricep values was $-.07$. The mean thigh skinfold was 30.53 mm. and the ultrasound average was 7.03 mm. The correlation between the thigh values was $.10$. Further analysis of the thigh ultrasound values produced a mean percent of 19.21, which represented the skin and fat tissue in the total cross sectional area at that site. The correlation between the percent value and thigh skinfold increased slightly to $.29$. Evidently in assessing subcutaneous tissue the two techniques are not comparable. Certain disadvantages of the caliper method have been previously discussed by authors. Therefore, it is plausible that the ultrasonic method may be capable of providing greater accuracy in measuring subcutaneous tissue.

H.H. Merrifield
Division of Physical Therapy
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April 16, 1973
9:00 a.m.

PREDICTION OF BODY DENSITY IN YOUNG AND MIDDLE-AGED MEN. Thomas Hickman, Michael L. Pollock, A.C. Linnerud, Zebulon Kendrick, Glen Dawson, Richard Kemp, Wake Forest University.

The estimation of body density (D) from equations based upon skinfold fat (S), girth (G), and/or anthropometric (A) measures is well established. Most of these equations have been based upon data collected from young men and their indiscriminate use with middle-aged and older populations has been questioned. The purpose of this investigation was to predict D of middle-aged men (MA) and young men (YM). Specific goals were twofold. First, to determine if D could be estimated as accurately with MA as with YM, and second, to compare contributing factors for respective formulae. Eighty-four volunteer MA 40 to 55 years of age, and 95 YM 18 to 22 years of age, were evaluated by the hydrostatic technique and 7 S, 14 G, and 9 A measures. Body density determined by the hydrostatic technique was used as the criterion variable. A total of the 30 variables previously mentioned plus age, body weight, and ponderal index, were used as dependent variables. The data were analyzed by the multiple regression technique, whereby the best combinations of all variables were used in the development of equations for predicting D. Data for MA showed chest and axilla S and gluteal and forearm G measures to be the best combination of 4 variables in predicting D ($R=0.83$). The elimination of axilla S dropped the correlation to 0.81. Mean D for MA was 1.050 g/ml ($SD \pm 0.013$) and percent fat (PF) 21.3 ($SD \pm 5.5$). The sum of 7 S (chest, axilla, triceps, subscapular, abdominal, suprailiac, and thigh), height, and biacromial width correlated 0.87 with the criterion for YM. The sum of 7 S, and the ponderal index correlated 0.86. Mean D for YM was 1.075 g/ml ($SD \pm 0.014$) and PF 11.0 ($SD \pm 5.6$). The data showed that D was more predictable in YM and respective formulae had different contributing factors.

Thomas Hickman
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April 16, 1973
9:15 a.m.

PREDICTABILITY OF SEGMENTAL LEG VOLUME OF COLLEGE FEMALES. Victor L. Katch, The University of Michigan.

The right leg volume of seventy college females was determined by the water-displacement technique. The mean volume, 9.80 liters (SD = 1.54) was not significantly different ($P = .01$) than the volume (9.33 l, SD = 3.1) calculated from a combination of seven leg volumes determined from girth measurements. Step-wise multiple regression analysis using the seven segmental volumes to predict total leg volume determined by the water displacement technique yielded a multiple R of .95 with a standard error of estimate of 54 ml. The gluteal furrow circumference correlated $r = .87$ (Sey 77.8 ml) with the criterion leg volume measurement. A multiple R of .92 (Sey 64.8 ml) was obtained by adding 3 additional girths, max calf, max knee and thigh. Body weight correlated $r = .91$ with leg volume, while a combination of body weight and max calf girth yielded a multiple R of .93 (Sey = 57.2 ml). Data including leg weight, leg density, length and various leg girths are also reported.

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April 16, 1973
9:30 a.m.

EFFECTS OF A SEASON OF WRESTLING ON BODY COMPOSITION OF HIGH SCHOOL MALES. B. Don Franks; R. H. Yost¹; E. Burke²

The effects of a season of wrestling was determined on high school males. The wrestlers (N = 12) and non-wrestlers (N = 12) were tested prior to formal conditioning as a team (Oct.); prior to the season (Nov.); at the end of the season (Feb.) and six weeks after the season (April). Underwater weighing, with residual volume determination, was used to determine body density, fat weight, non-fat weight, and percent fat. There were no significant differences (.10 level) determined by t test on any of the variables in October. There were no significant differences on body weight or non-fat weight at any of the testing periods. The wrestlers had greater body density and less fat weight and % fat in November, February, and April, with the greatest differences observed at the end of the season.

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April 16, 1973
9:45 a.m.

THE EFFECT OF BODY CONDITIONING ON BODY COMPOSITION.
Carol Gulyas, California State University, Fresno.

The purpose of this investigation was to determine the effect of body conditioning, as experienced by seventy female volunteers from physical education body conditioning courses, on the selected parameter of body composition. The importance of this study was predicated on the thesis that quantitative and qualitative changes can take place in body tissues as a result of body conditioning activities. Traditionally change in total body weight has been employed as an indication of changes in body compartments. Body composition measurements of specific gravity, percent body fat, and lean body mass give a more accurate index of the quality of tissue changes than standard tables which are interpreted in relation to height and weight. This appraisal can be pragmatically utilized by students of body conditioning classes in order to more precisely realize the physiological changes occurring as a result of body conditioning. Body composition was determined by the underwater weighing of each subject in the Rich densitometric tank at the California State University, Northridge, and the subsequent calculation of body fat from body density. The formula developed by Keys and Brozek (1963), with corrections for residual lung volume and gas in the intestinal tract, was utilized for the determination of percent body fat. The data collected during the experimental period were statistically analyzed through analysis of variance to determine the significance of the within group differences which occurred between pre, middle, and post test results. Significant within group differences were found between scores for body density, percent body fat, lean body weight, and kilograms of body fat, although no significant change in total body weight was found. The .05 level of confidence was accepted for each statistical analysis as an appropriate measure of significance. The following general conclusion appeared to be justified: Body conditioning, as experienced in a one-semester program, did significantly change body composition as evidenced by decreases in percent body fat and total body fat, and increases in total body density and lean body mass.

Carol Gulyas
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April 16, 1973
10:00 a.m.

RELATIONSHIPS BETWEEN BODY COMPOSITION AND PHYSICAL PERFORMANCE IN PREPUBESCENT BOYS. Kirk J. Cureton, Ball State University.

The purpose of the study was to determine the relationship between three independent body composition measures and scores on 13 physical performance items in 54 prepubescent boys, 8-11 years of age. The body composition measures included body density obtained using hydrostatic weighing with residual volume determination, total body potassium (grams) obtained by whole-body counting of radioactive potassium-40, and the sum of ten skinfold thickness measurements obtained using Lange skinfold calipers. The physical performance items included the seven items of the AAHPER Youth Fitness Test, vertical jump, mile run and four dynamometric strength tests. The values for the body composition measures were intercorrelated with the physical performance items using the Pearson product-moment correlation coefficient. Body density was positively related to all types of physical performance except static strength. The highest relationships were obtained between body density and performances on pull-ups (0.62), 600-yard run (0.52) and 50-yard dash (0.42). These relationships are all higher than those of the same performance items with age, height or weight. Grams of total body potassium was related highest to tests of static strength or power. The highest correlations were obtained between grams potassium and performances on right grip strength (0.87), left grip strength (0.73), back strength (0.56), vertical jump (0.48) and softball throw for distance (0.45). Negative correlations were obtained between the sum of ten skinfold thickness measurements and scores on all motor performance test items except the softball throw. The highest negative correlations were obtained between the skinfold sum and performances on the 600-yard run (-0.71), pull-ups (-0.49), and the mile run (-0.43.) It was concluded that other factors or a combination of other factors is of more importance in predicting the physical performance items investigated, except in the case of static strength where fat-free weight appears to be the dominant factor.

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April 16, 1973
10:15 a.m.

EFFECTS OF CHRONIC AND ACUTE EXERCISE UPON SELECTED BLOOD MEASURES* J.L. Roitman, Central Michigan University; P.J. Brewer, Community Pesticide Laboratory, Greeley, Colorado.

The purpose of this study was to investigate the effects of chronic and acute exercise upon selected blood measures and indices. Nine male cross-country runners were studied over the course of an eight week season and during two weeks of de-training. Red blood cell count, hemoglobin, and hematocrit were measured using standard laboratory techniques. Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentrations (MCHC) were calculated using standard formulas. Samples were taken during the pre-season, at two times during training, once after the season was completed, and after two weeks of de-training. The analysis of chronic effects show that all measures except MCV increased during the season. MCHC increased most significantly ($p < .001$). The de-training period showed a significant decrease in MCHC and a significant increase in MCV. Analysis of acute effects show consistent hemoconcentration after both types of conditioning session (intermittent and continuous). The increases were similar for each type of session showing little difference due to form of exercise. The increases due to chronic exercise show, to some extent, an increased oxygen carrying capacity of the subjects. Those increases due to hemoconcentration are, perhaps, of little value to the performer during exercise compared to the effects of increased stroke volume, increased cardiac output, or the shift to the right of the oxy-hemoglobin dissociation curve.

*This research was partially funded by Contract No. FDA 70-28 with the Division of Pesticide Community Studies, Environmental Protection Agency, Chamblee, Georgia and was completed at the University of Northern Colorado.

J.L. Roitman
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April 16, 1973
10:30 a.m.

SERUM INSULIN AND GLUCOSE RESPONSES TO ACUTE EXERCISE AND
CHRONIC CONDITIONING IN ADULTS. John A. White & A. H. Ismail,
Purdue University.

To study the effect of acute exercise (a single bout) and chronic conditioning (four months physical conditioning) on the serum insulin levels and glucose concentration in adult males. Two groups, one active and one sedentary (both $n=11$), were established from subjects aged 26-56 years, who participated in the fitness program. Pre and post program tests were carried out on a bicycle ergometer and venous blood samples obtained at four metabolic stages: 1) rest, 2) sub-maximal exercise, 3) maximal exercise, and 4) recovery. Serum insulin was determined by a radioimmunoassay technique and serum glucose by a colorimetric procedure. Significant increases in serum insulin levels were noted in both groups at the pre and post test during exercise and decreases during recovery. Serum glucose concentration showed little or no change in the sedentary group, but significant increases in the active group during exercise. Significant differences were observed between the sedentary and active groups in terms of the levels of insulin and glucose concentration at pre and post tests. The only significant differences observed between pre and post tests for the sedentary and active groups individually occurred at maximal exercise where a decrease in serum insulin was observed in spite of rising glucose concentrations. Possible mechanisms are discussed relating to inhibition of insulin secretion. The data provide evidence of a bi-directional response of insulin levels and glucose concentrations during exercise, with differences between active and sedentary groups, but no changes resulting from chronic physical conditioning, except during maximal exercise stress.

John A. White
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April 16, 1973
10:45 a.m.

EFFECTS OF VICARIOUS SPORTS PARTICIPATION ON HEART RATES OF
SUBJECTS OF VARYING LEVELS OF ANXIETY AND AGE. Charles B.
Corbin, Kansas State University.

It was the purpose of this study to determine if vicarious sports participation (being a spectator at a college basketball game) effects the heart rate of middle age male subjects of different ages and anxiety levels. Fifty adult men (ages 28-65) who regularly attended varsity basketball games at Kansas State University constituted the group from which subjects were chosen for the study. All fifty men took the Taylor Manifest Anxiety Scale to determine their "trait" anxiety level. Based on these scores and the age of each subject, twenty men were assigned to four groups of five each. The groups were high anxiety-high age, high anxiety-low age, low anxiety-high age, and low anxiety-low age. One subject from each cell of the experiment was monitored (ECG) via biotelemetry during each of five different basketball games. The total number of heart beats for each subject for the entire game was counted using the R spike of the ECG tracing. Data were analyzed using the one-way and factorial analyses of variance.

Mean scores of subjects of high anxiety were not significantly different from low anxiety subjects when compared on the following variables: resting heart rate, average heart rate (total game), pre game heart rate, and maximal heart rate achieved during the game. Older subjects did have significantly higher pre game heart rates than did younger subjects. However, older subjects did not differ from younger subjects when compared on resting heart rate, average heart rate during the game, maximal heart rate, or cardiac cost. There was no significant difference between mean scores of subjects tested during each of the five different basketball games. There was no significant interaction between age and anxiety.

Charles B. Corbin
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April 16, 1973
11:00 a.m.

EFFECTS OF TRAINING FOUR DAYS PER WEEK ON CARDIOVASCULAR AND BODY COMPOSITION PARAMETERS OF MIDDLE-AGED MEN. Henry S. Miller, Jr., Michael L. Pollock, A. C. Linnerud, Elizabeth Coleman, Elizabeth Eddins, Robert Robertson, Wake Forest University.

The purpose of this investigation was to determine the effects of training 4 days per week on selected cardiovascular and body composition measures of adult men. Nine healthy sedentary men 28 to 47 years of age (mean 38.4) volunteered to train 30 min, 4 times per week for 20 weeks. Ten controls of similar qualifications were also evaluated. The cardiovascular evaluation included assessment of maximal oxygen intake (max VO_2), resting heart rate (RHR) and blood pressure (BP), and heart rate response to a standard treadmill run (STR). The STR included a 5 min run, at 6 mph, 2.5% grade followed by a 5 min sitting recovery. Body composition determination included the following test items: body weight; estimations of body density and percent fat by both hydrostatic and skinfold techniques; a summation of 7 skinfold fat measures (TSF); and, selected girth measures. Time motion analysis was used to estimate the energy cost of training. Training heart rates were also estimated by the palpation technique (beats/10 sec) at the middle and end of each training session. Training heart rates averaged from 80% to 90% of maximum with intensity of training increasing with weeks of training. Initial distance covered was 2.5 miles per training session, and progressed to 3.7 miles. The experimental group improved significantly in most cardiovascular and body composition variables. This was shown by increases in max VO_2 from 42 to 47.3 ml/kg·min, maximum pulmonary ventilation from 130 to 153 l/min, and O_2 pulse from 19.5 to 23.1 ml/beat, and a reduction in RHR from 65 to 58 beats/min; and most all HR values from the STR. BP remained unchanged. Body composition values showed significant reductions in body weight, body density, percent fat, TSF, and abdominal, gluteal and thigh girths. The control group remained constant in most cardiovascular and body composition measures.

Henry S. Miller
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April 16, 1973
11:15 a.m.

THE INTER-RELATIONSHIP BETWEEN MODES OF EVALUATION AND TRAINING.
Michael L. Pollock, John Dimmick, Henry Miller, Zebulon Kendrick,
A. C. Linnerud, Wake Forest University.

This investigation was designed to determine the inter-relationship of four modes of stress testing before (T_1) and after (T_2) 20 weeks of endurance training. It was hoped to determine if training effects were independent of mode of evaluation. Twenty-six sedentary middle-aged men (\bar{x} age = 38 years) volunteered to participate in this project and were randomly assigned to one of the following training groups: Group I, running (R:n=9); Group II, walking (W:n=9); and Group III, bicycling (B:n=8). All groups trained for 30 minutes 3 times per week at 85 to 90% of maximum heart rate (Max HR). Group I trained on a 1/4 mile track, II on a motor driven treadmill, and III on a Quinton stationary bicycle. Training was closely monitored and daily logs were maintained for both work load and heart rate determinations. The tests for each of the subjects included 3 maximal ones; R treadmill (TR), W treadmill (TW), and B; and the Astrand-Rhyming submaximal B test (AR) for prediction of maximum oxygen intake (max $\dot{V}O_2$). Seven matched controls were evaluated on all test items. At T_1 all groups performed equally on the TR, TW, and AR tests in max $\dot{V}O_2$, and lower on the B (-15%). In general, a similar relationship was found with maximum pulmonary ventilation, max HR, and O_2 pulse. At T_2 Groups I, II, and III improved on all modes of testing in max $\dot{V}O_2$ and O_2 pulse. Although significant, these increases were lower on the B test for groups I and II, while III could perform equally on all three maximal tests. The AR test showed a 15% over prediction in max $\dot{V}O_2$ for Group III. The control group remained constant in all variables. The difficulty in the evaluation of training results when mode of testing and training are mixed was clearly illustrated.

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April 16, 1973
11:30 a.m.

EXERCISE OXYGEN UPTAKE KINETICS IN OBESE MIDDLE-AGED MEN. Ben R. Londeree, University of Missouri; and John A. Roberts, University of Missouri

The kinetics of oxygen uptake at the beginning of exercise were studied in 30 obese, low fit, middle-aged men. Exercise consisted of walking or running on a treadmill at speeds of 3, 4, and 5 m.p.h. for 8 min. or 3 separate days. The order of runs for each subject was randomly selected from 6 sequences based on a balanced Latin squares design. Expired air was collected in meteorological balloons and subsequently analyzed for periods of 20 sec. duration during the first 2 min. of exercise, for every minute during the next 3 min., and for the final 3 min. It was determined that the oxygen consumption changes at the 2 lower speeds could be described by single exponential functions. However, at 5 m.p.h. 2 exponential curves were required; one was a fast component that lasted for about 100 sec. while the other was slower and lasted for nearly the remainder of the work period. The exponential rate of change in oxygen consumption was reduced as the work intensity increased. Individual rate constants demonstrated considerable variability. The results about the effect of fitness on oxygen kinetics were unclear. Age did not appear to be a factor.

Ben R. Londeree
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April 16, 1973
11:45 a.m.

PERSONALITY OF WOMEN ATHLETES IN ATHLETIC COMPETITION AS MEASURED
BY THE EDWARDS PERSONAL PREFERENCE SCHEDULE. Peggy Thomas,
Southwest Missouri State University.

This study was undertaken to determine if there are any distinguishable personality traits of women who did not participate in organized athletic competition as opposed to women who participated in team sports and individual sports competition, and also to search for any definable personality traits which might differentiate athletes in one sport from another. Three major criterion groups were used which included an individual sports group, team sports group, and a control group. The subjects in the two sports groups included 65 college women from Southwest Missouri State University who participated in interscholastic competition during the 1969-70 and 1970-71 school year. Twenty subjects were included in the control group. The Edwards Personal Preference Schedule was the personality test administered to all subjects who participated in the study. Discriminant Function Analysis was used as the statistical procedure to explore among the variables which best discriminated among the groups established. A three-part discriminant analysis was performed grouping the subjects into a control group, individual and team sports group. A Univariate F test was used to test the significance. The findings of this study indicated that the women who participated in the individual and team sports groups were more dominant than the control group. The study further indicated that no distinct personality differences were found between the individual and team sports participants. It would seem from the results of this study that since no distinct personality differences were found between individual and team sports participants, that the female athlete would be unable to select her sport on the basis of personality. Furthermore, it would help to eliminate some of the inaccurately held stereotypes depicting the female athlete as aggressive, masculine and asexual. This study further embraces the concept that personality is difficult to define and includes a variety of elements.

Peggy Thomas
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April 16, 1973
9:00 a.m.

CHARACTERISTICS OF INTERCOLLEGIATE COMPETITORS
Diane T. Wendt, University of Denver

This study was undertaken to determine if there were significant differences in personality variables between women participating in intercollegiate team sports compared to women involved in individual sports competition at Colorado State University during the 1970-71 school year. The Edwards Personal Preference Schedule was chosen as the instrument for personality assessment and was administered to 42 women intercollegiate competitors who volunteered to take part in the study. Data were organized and analyzed for each of the 15 personality variables of the Edwards Personal Preference Schedule. There were 21 subjects in the individual sports group and 21 competitors in the team sports group. The mean scores were computed for each group with regard to each variable. A two-tailed, uncorrelated t test was used to determine if any significant differences existed between the two groups. The .05 level of significance was used by the investigator. The null hypothesis that no differences exist between women intercollegiate individual sports competitors and team sports competitors was tested. Results of the testing indicated that no significant differences in personality traits as measured by the Edwards Personal Preference Schedule existed between the two groups with the exception of heterosexuality. In regard to this variable, the individual sports competitors scored significantly higher than the team sports competitors. It should be noted that there is the possibility that this significant difference may have been due to chance. This study would tend to support Magie's study which also reported a significant difference of the personality variable heterosexuality between individual sports and team sports competitors. The individual sports competitors were reported to have scored significantly higher on heterosexuality than the team sports competitors. This study would also tend to be in agreement with Rosenbrock (45) who found no significant differences in personality between individual sports competitors and team sports competitors.

Diane T. Wendt
University of Denver
Denver, Colorado

April 16, 1973
9:15 a.m.

Griffin, Patricia S. Perceptions of Women's Roles and Female Sport Involvement Among A Selected Sample of College Students. University of Massachusetts, Master of Science in Physical Education, 1972, 186 pp. (John W. Loy, Jr.)

The purpose of this study was twofold. One, to determine college students perceptions of selected women's roles and female sport involvement and two, to ascertain the association of selected socio-cultural characteristics with perceptions of women's roles and female sport involvement. Two hundred and seventy-nine undergraduate men and women at the University of Massachusetts completed a test inventory which included the following instruments: (1) a questionnaire to determine selected socio-cultural characteristics, (2) a semantic differential to determine perceptions of six women's roles: housewife, woman athlete, girlfriend, woman professor, mother, and ideal woman, (3) a variation of the Lifestyle and Perspective Index to determine local-cosmopolitan orientation, and (4) a single scale semantic differential to determine perceptions of the appropriateness of female involvement in selected sports. A multiple discriminant function analysis revealed that college students have distinct perceptions of the six women's roles studied, but not the selected sports. Sex and cosmopolitanism were the socio-cultural characteristics statistically significantly related to perceptions of women's roles. However, regardless of the socio-cultural characteristic studied, the roles of woman athlete and woman professor were perceived as the most potent and active roles and the least highly evaluated roles for women. Only cosmopolitanism was statistically significant in differentiating perceptions of female involvement in selected sports.

Patricia S. Griffin
Women's Physical Education
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April 16, 1973
9:30 a.m.

AN EXPLORATION OF CHOICE IN A VOLUNTARY COLLEGE PHYSICAL EDUCATION PROGRAM. Barbara Baxter Pillinger, Harvard University.

A questionnaire study was undertaken to ascertain student attitude toward and actual participation in the voluntary physical education program at Radcliffe College. Basic to the study were the theoretical assumptions that choices form the core of individuality and that it is in the realm of the freely chosen that man is most himself. A longitudinal analysis, involving the Class of 1966 as freshmen and as seniors, tested three effects: (1) Group (participants [Ps] vs. non-participants [NPs]), (2) Time (freshmen vs. seniors), and (3) Interaction. A second analysis compared two different senior groups, the Class of 1964 (the last class to experience the freshman requirement) and the class of 1966 (the second class to experience the voluntary program), and tested three effects: (1) Group (Ps vs. NPs), (2) Program (required vs. voluntary), and (3) Interaction. All main effects were significant at .01 or better; the interactions were not significant. The statistical procedures used in reporting and analyzing the data were chi square, multivariate analysis of variance, and discriminant function analysis. Significant mean contrast profiles for the forty-one variables in the study were developed and discussed for each of the main effects. Both analyses examined differential aspects of Ps and NPs in the voluntary program -- their previous associated experience, present self-descriptions, and subsequent related choice behavior. The results indicated that Ps and NPs differed significantly along certain psychological dimensions and that personality dimensions were reflected in recreational choice. Voluntary seniors participated to a much greater extent (73%) than did those who had experienced a requirement (only 48%). This participation difference was significant at the .001 level. "Forced play" appeared to be a paradox, a contradiction both in terminology and in actuality. This choice exploration suggests that guidance for leisure through avocational development holds much potential for humanizing and enhancing the quality of life. To help individuals seek and realize a personal style of life through leisure choices and skills may well give to college physical education programs their greatest significance.

Dr. Barbara B. Pillinger
Lathrop Hall
University of Wisconsin-Madison

April 16, 1973
9:45 a.m.

**CHARACTERISTICS OF STUDENTS ENROLLED IN THE VOLUNTARY PROGRAM
OF BASIC INSTRUCTION AT THE UNIVERSITY OF WASHINGTON. Ha A Lawson**

The purposes of this extensive pilot investigation were two-fold. Student input regarding policies and procedures related to the conduct of the voluntary program was solicited. More importantly, the investigation was designed to procure relevant data pertaining to the physical activity backgrounds and other selected characteristics of students who actually elected classes at the University of Washington during the Spring Quarter of 1971. Classes were randomly selected from six strata: 226 students ultimately completed the questionnaires which were designed and administered by the investigator. On the basis of specific findings of the investigation, two general conclusions appear to be warranted. Firstly, the students who elect physical education at the university have extensive backgrounds in both instructional and organized extracurricular programs of physical activity, supportive of the hypothesis that structure begets structure. Secondly, the homogeneity of responses to questions regarding the subject's identification with visible groups of students and their respective participation in social and campus activities constitutes a basis for the hypothesis that students who elect physical education at the college level might constitute a distinct subculture of the total student population.

Hal A. Lawson
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April 16, 1973
10:00 a.m.

FLUID INTELLIGENCE AND THE PERFORMANCE OF JUNIOR SKI RACERS.
Robert E. Gensemer, University of Denver; Paul Rachetto.

It is generally accepted that successful performance in ski racing involves perceptual abilities as well as physical skill. Yet only scant research is available relating to the cognitive attributes of ski racers. Conceivably, coaches of the sport could profit from psychological assessments of their athletes. In such context this study has appraised the fluid intelligence of junior ski racers and compared that appraisal with their competitive ski success. As a relatively new measure of mental abilities, fluid intelligence is defined as the capacity to visualize and perceive complex relations, maintain a span memory, and reason out logical solutions to problems within restricted time periods. It is essentially innate, and is in contrast to crystallized intelligence, which is booklearned knowledge attained through educational and cultural opportunity. Six written tests of fluid intelligence were administered to twenty junior ski racers, ages 14 through 18, all experienced in ski racing competition. The results were compared with their F.I.S. point standing which each skier had attained through actual competition. F.I.S. points are established by the Federal International SKI, the organization in control of ski racing throughout the world, and are awarded on the basis of results in sanctioned ski racing competition. The racers selected for this study had attained a considerable range of F.I.S. points, representing very successful to very poor racing performance. All competitors were from the Rocky Mountain area. Regression analysis and cross-tabulation analysis were used to compare results. Outcomes of the study showed that slalom (downhill racing on a course defined by obstacles, called gates) performance was more a factor of age and experience than of the measured fluid intelligence of the performer. By contrast, downhill (racing over changing terrain, without gates) performance is very significantly related to the fluid intelligence of the performer. Very probably, since downhill courses differ markedly from one another, and since each race therefore presents a new situation to the racer, those with natural decision making ability will perform best in this event.

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April 16, 1973
10:15 a.m.

THE EFFECT OF VARIANT DOSAGES OF AMPHETAMINE UPON ENDURANCE.
Melvin H. Williams, Old Dominion University; John Thompson, Plaza
Junior High School.

The purpose of this study was to provide basic information concerning the acute effects of a small, moderate and large dose of d-amphetamine sulfate upon muscular endurance; a secondary purpose involved the effect upon resting, submaximal and maximal heart rate. Twelve male university students underwent four separate trials of a progressive work task on an electric bicycle ergometer. Prior to each trial the subject consumed either - placebo (0 mg), small (5 mg), moderate (10 mg) or large (15 mg) dose of d-amphetamine sulfate per 70 kg body weight. A repeated measures ANOVA revealed significant F ratios ($P < .05$) for the RHR and MAX HR. The Neuman Keuls analysis indicated the RHR for the moderate dose was higher than the placebo condition, while all three amphetamine doses elicited a higher maximal heart rate than the placebo. It was concluded that variant dosages of d-amphetamine sulfate do not influence maximal endurance capacity or the heart rate during submaximal exercise, while the effect exerted upon RHR and MAX HR may have been due to chance occurrence.

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April 16, 1973
10:30 a.m.

ACUTE COLD RESPONSE IN EXERCISE CONDITIONED RATS. Roger Seaman and Alan K. Chin, York University, Toronto, Canada.

Sprague Dawley rats undertook a three week treadmill running exercise programme of light, moderate and heavy intensities. Seventy-two hours following the termination of the conditioning programme, the exercised animals and non-exercised control animals were placed in -20°C cold for three hours. Rectal temperatures, catecholamines, glucocorticoids, muscle and liver glycogen, plasma glucose and lactate were determined and compared among the cold exposed animals and with an environmental control group of animals. Exercise conditioned animals were able to maintain rectal temperatures within 1.5°C of the controls 37°C ; non-exercised temperatures decreased a significant 4.5°C . A "glycogen sparing" process was evident in conditioned animals, but not in non-exercised. Circulating plasma hormones indicated all animals were stressed, though the non-exercised significantly more.

Roger Seaman
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April 16, 1973
10:45 a.m.

LONG TERM CIGARETTE SMOKING AND THE DEVELOPMENT OF CARDIORESPIRATORY ENDURANCE IN ALBINO MICE. Donald H. Poretz, Dutchess Community College, State University of New York.

It is a generally accepted tenet of athletics that cigarette smoking is not only deleterious to health, but is specifically contraindicated for athletes as it diminishes cardiorespiratory efficiency. Such deleterious effects as theoretically should develop are posited to develop chronically and include lung tissue destruction and coronary arteriosclerosis. Unfortunately, the bulk of the research has been of an acute nature or non-experimental in design. Thus, while there is a very extensive body of literature, there is a paucity of well-controlled, long-term studies. This study was designed to bring to bear techniques of control, randomization and chronicity. 50 pairs of albino mice were divided into experimental and control groups. The nine month experimental period was divided into three periods of three months. During the first three month period the experimental group was force-smoked by means of a smoking machine. During the second experimental period the force-smoking was continued for the experimental group and both experimental and control groups were begun on a progressive, forced-exercise regimen (swimming with 10% weights attached). During the third three month period, the forced-exercise was continued for both groups, but the experimental group's forced-smoking was ceased. Maximum swimming time was recorded for each animal at the beginning and conclusion of each of the three experimental three month periods. Analysis of covariance indicated significantly lower endurance development for the experimental group for the 3-6 month and 0-9 month periods but not for the 0-3 month or 6-9 month periods. These analyses suggest that long-term cigarette smoke inhalation in albino mice diminishes their development of cardiorespiratory endurance and that this deficiency does not appear to be reversible.

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April 16, 1973
11:00 a.m.

THE USE OF ATTITUDES AND BELIEFS AS INDICATORS OF SUBSEQUENT
SMOKING BEHAVIOR. Anne M. Downey, Ohio State University; Thomas
W. O'Rourke, University of Illinois.

Purpose - The purpose of this study was to assess if the initial attitudes and beliefs of a behaviorally homogeneous group can be utilized as indicators of future smoking behavior. Specifically, the key question investigated was to assess if the initial attitudes and beliefs of a group of original seventh grade smokers in 1966 were indicative of future smoking behavior in 1968. **Procedure** - The students included were those seventh graders who classified themselves as never smokers on the initial survey in 1966 and who participated in all three surveys over the two year period. A total of 1228 females and 868 males met these criteria. This represented a 68% retention rate over the study period. Data were treated by sex. For the initial survey a forty-four question Likert type attitude-belief form was administered. To reduce matrix dimensionality, a factor analysis was employed, and a score for each subject calculated for each factor. In 1968 subjects classified themselves according to their present smoking behavior as either a smoker, ex-smoker or never smoker. Using these three groups, an analysis of variance technique was employed to assess if initial attitude-belief differences existed between the three subsequent behavioral groupings. **Results** - For the original never smoker seventh grade females, initial attitude-belief mean difference scores were found on the pleasure and exemplar factors. Never smokers who remained never smokers had more favorable attitudes toward non-smoking than those who became smokers or ex-smokers. Significant differences for male data were found on the pleasure, influence, and health and disease factors. Again, initial never smokers who maintained their behavior exhibited more favorable attitudes and beliefs than those who became smokers or ex-smokers. These results suggest that attitudes and beliefs of initial never smokers may serve as indicators of future behavior. It appears that items of an affective rather than a cognitive domain are more useful indicators. However, the complexity of the influencing factors of a smoking or non-smoking behavior is manifested, with the exception of the pleasure factor, by the existence of different factors being significant for different sexes at the same grade level.

Anne M. Downey
Dept. of Health Education
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Columbus, Ohio

April 16, 1973
11:15 a.m.

THE RELATIONSHIP BETWEEN THE PERCEIVED HEALTH THREAT OF VARIOUS
SUBSTANCES TO PATTERNS OF NON-USAGE BEHAVIOR. Thomas W. O'Rourke,
Ph.D., M.P.H., University of Illinois; Gary L. Martin, Ph.D.,
University of Nebraska.

Purpose - The purpose of this investigation was to determine the relationship between the perceived health threat of various substances and the non-usage of such substances. It was hypothesized that non-usage behavior is related to the perceived health threat of a substance upon an individual. Specifically, non-usage increases as the perceived threat increases. Procedure- To test the relationship, a mail questionnaire survey of a random sample of the University of Nebraska student body was conducted. No identifying information was solicited. A total of 824 usable questionnaire forms were returned. Subjects were asked to estimate the perceived health threat to them of a number of substances using a five point scale for each substance. Substances ranged from milk to heroin. The mean score for each substance was then calculated. A rank order was developed which ranged from high to low perceived health threat. Subjects were queried also as to the extent of non-usage of such substances. A rank order correlation was then calculated to assess the degree of relationship between the perceived health threat and the pattern of non-usage. Results - A significant relationship in a positive direction (.78) was found between perceived threat and non-usage. This finding seems to evidence that the greater the perceived threat, the greater the non-usage behavior for a particular substance. The result appears to suggest that drug education programs which focus on efforts toward increasing the perceived health threat of a particular substance might enhance the possibilities of discontinued usage or continuation of non-usage patterns of such substances.

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April 16, 1973
11:30 a.m.

ITEM ANALYSIS OF KILANDER HEALTH KNOWLEDGE TEST USING FOUR INDEPENDENT POPULATIONS. Donald E. Campbell and Roy A. Foster, Oregon State University.

The purpose of this investigation was to conduct an item analysis of the Kilander Health Knowledge Test based on responses of four independent groups in order to determine if response tendencies to test items were peculiar to groups studied and if test items retained independence regardless of the population group. The 1969 edition of the Kilander Health Knowledge Test was administered to all of the ninth and twelfth grade students attending a high school representing a high socioeconomic level and a low socioeconomic high school. Item analysis data to include Difficulty Index and Discriminant Index, distribution of responses to include X^2 values for independence of distribution, and correlation and regression coefficients of the criterion responses were obtained. The number of respondents in both the lower and upper 27 percent of the range of scores represented an equal proportion of each criterion group with the exception of the ISL-9 group. Test items 9, 29, and 55 were the least difficult items, while items 91, 63, 97, and 88 were the most difficult items. Items 4, 13, 14, 38, 50, 65, 69, 73, 83, and 94 had the greatest variation in Difficulty Index. Difficulty of the test items appeared to be within the item rather than within the health topic. The Discriminant Index indicated very little difference between the responses by socioeconomic level; however, the twelfth grade students had considerably fewer items with a low or negative Discriminate Index. Significant X^2 value for independence of distribution was obtained for all but 10 items. Five of these items with unequal distribution were from the Personal Health Category. No consistent pattern of difference of r for category to total score resulted. Common regression coefficient values were also obtained. While the Discriminant Index, Difficulty Index, and X^2 values for independence of response would suggest that the four populations responded to the items with the same degree of independence, the consistency of the correlation and regression coefficient values suggested that the test items had common response tendencies within the population groups. The Kilander Health Test was deemed to be sensitive to response tendencies of independent population groups and at the same time to have a high degree of consistency within the population groups. Analysis procedures also established that test item categories were independent regardless of the population.

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April 16, 1973
11:30 a.m.

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